

REMARKS

The Official Action mailed June 4, 2002 has been received and its contents carefully noted. Filed concurrently herewith is a *Request for One Month Extension of Time*, which extends the shortened statutory period for response to October 4, 2002. Accordingly, Applicant respectfully submits that this response is being timely filed.

Applicants note with appreciation the consideration of the Information Disclosure Statement filed on May 13, 1999.

Claims 1-11 and 14-24 are pending in the present application, of which claims 1, 3, 5, 8, 10, 14 and 17 are independent. Claim 10 has been amended herewith. For the reasons set forth in detail below, all claims are believed to be in condition for allowance and favorable reconsideration is respectfully requested.

Paragraph 1 of the Official Action objects to Figures 20-21 asserting that they should be labeled Prior Art. In response, a *Request for Drawing Change Approval* is submitted herewith to include the legend Prior Art as required by the Examiner. Reconsideration is requested. 7

Paragraph 2 of the Official Action objects to the drawings under 37 CFR 1.83(a) asserting that there is no pictorial illustration of a reflection layer formed on a common electrode as recited in claim 10. In response, claim 10 has been amended herewith to remove reference to the reflection layer and thus this rejection is believed to be moot. Reconsideration is requested. om

Paragraph 3 of the Official Action objects to the specification as lacking support for the limitation in claim 10 of a reflection film formed on a common electrode. Paragraph 5 of the Official Action further rejects claims 10 and 11 as lacking support. In response, claim 10 has been amended herewith as noted above to remove reference to the reflection layer and to recite a step of forming a dielectric multi-layer film on the common electrode. By virtue of this amendment, the objection to the specification and rejection of claims 10-11 is believed to be moot and reconsideration is requested. ok

Paragraph 7 of the Official Action rejects claims 17-19, 21 and 23 as obvious based on the combination of U.S. Patent 6,108,056 to Nakajima and JP 07-230101 to Masaya et al. The Official Action asserts that Nakajima discloses an active-matrix LCD having a second reflective layer 116, a pixel electrode 118, and a first reflective layer

(i.e. a dielectric film 117) therebetween. The Official Action admits that Nakajima does not disclose that the dielectric film comprises a multi-layer film and cites Masaya to cure this deficiency. The Official Action concludes that one of skill in the art would have been motivated to combine the teachings of Nakajima and Masaya since it is a common practice in the art to obtain a bright clear display image as stated in paragraph [0005] of Masaya.

As stated in MPEP § 2143-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

It is respectfully submitted that the Official Action has failed to establish a *prima facie* case of obviousness. The prior art of record, taken alone or in combination, fails to teach or suggest each and every limitation of the invention. In Nakajima, layer 116 designates a titanium electrode used also as a black matrix (column 13, lines 47-52). Layer 116 is used not only as a black matrix, but also as one electrode of a capacitance formed between layer 116 and pixel electrode 118 with interlayer insulating film 117 disposed therebetween. Nakajima does not teach or suggest anything about reflectivity and clearly fails to disclose or suggest a dielectric multilayer film or a metal layer for improving reflectivity as in the present invention. In fact, layer 116 operates as a black

matrix and thus cannot operate as a reflective layer as asserted in the Official Action since the titanium electrode has a low reflectivity. → do have a function of reflection (even 1%)

Furthermore, the Official Action has failed to establish a sufficient motivation to combine the teachings of Nakajima and Masaya. If one of skill in the art wishes to achieve a bright clear display image as set forth in paragraph [0005] of Masaya, which is the motivation alleged in the Official Action, one need look no further than Masaya itself. There has been an insufficient showing that one of skill in the art would have recognized that the dielectric film in Nakajima should be replaced by a multi-layer film since there has been no showing that one of skill in the art would have recognized that this would improve the display of Nakajima. To the contrary, such modification may well destroy the functionality of interlayer insulating film 117 of Nakajima.

Also, it should be noted that there are significant unobvious advantages associated with the present invention. The use of both a reflection layer comprising a metal material and a reflection layer comprising a dielectric multilayer film is particularly advantageous since the number of layers in the dielectric film can be reduced and the reflectivity can be improved without using a large number of layers. Therefore, for the above reasons, it is respectfully submitted that the Official Action has failed to establish a *prima facie* case of obviousness and favorable reconsideration is requested.

Paragraph 8 of the Official Action rejects claims 1-9 as obvious based on the combination of Masaya and U.S. Patent 5,168,383 to Iwaki et al. The Official Action continues to assert that Masaya and Iwaki disclose a thickness of a pixel electrode being satisfied by the equation $nd=\lambda/4$. Specifically, the Official Action asserts that the pixel electrode of the present invention and that of Iwaki are made of the same material and that Iwaki discloses a thickness range of 200-2000 Å that includes the claimed range of 50.5nm to 88.4 nm. Thus, the Official Action concludes that the thickness of the electrode in Iwaki would at least be obvious to the equation $nd=\lambda/4$.

With respect to the §103(a) rejection of claims 1-9 over Masaya and Iwaki, Applicants respectfully submit that amended claims 1, 3, 5, and 8 recite that pixel electrode has a thickness of 50.5 nm to 88.4 nm, and the thickness is satisfied by the equation $nd = \lambda/4$, where n is a refractive index, d is a film thickness, and λ is a center wavelength.

It is respectfully submitted that Iwaki broadly discloses that any value ranging from 200-2000 Å may optionally be selected as the thickness of the ITO electrode and specifically notes 1200 Å as a preferred thickness, which cannot satisfy the claimed relationship of $nd = \lambda/4$ as recited in the pending claims. Furthermore, the claimed range has particular criticality in the subject invention for improving reflectivity. By satisfying the equation $nd = \lambda/4$, reflectivity can be improved, which is neither disclosed nor suggested by Iwaki. There is no showing that one of skill in the art would have been motivated to specifically select a thickness from the broad range of 200-2000 Å that would satisfy the equation $nd = \lambda/4$ and, in fact, Iwaki teaches that one should use a thickness of 1200 Å, which cannot satisfy this relationship.

As stated in MPEP 2144.05:


Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

It is respectfully submitted that the claimed relationship of $nd = \lambda/4$ achieves an unexpected result, namely increased reflectivity, not found in the prior art range. Since Iwaki fails to disclose or suggest that the reflectivity can be improved as in the present invention, it is respectfully submitted that one of skill in the art would not have been motivated to select a thickness corresponding to the claimed relationship and favorable reconsideration is requested in view thereof.

Paragraph 9 of the Official Action rejects claims 14-16, 21, 22 and 24 as obvious based on the combination of Nakajima, Masaya and U.S. Patent 5,461,501 to Sato. It is respectfully submitted that the arguments above with respect to Nakajima are applicable here as well and that Sato does nothing to overcome the deficiencies noted above. In fact, shading layer 111 in Sato is also not used as a reflective layer but rather as a shading layer. Therefore, it is respectfully submitted that the prior art of record, taken alone or in combination, fails to disclose or suggest all of the claim limitations and favorable reconsideration is requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

10. (Twice Amended) A method of manufacturing a liquid crystal display device, comprising the steps of:

forming a switching element on a substrate;

forming an interlayer insulating film over said switching element;

forming a common electrode formed of a transparent conductive film over said interlayer insulating film;

forming [a reflection layer comprising] a dielectric multi-layer film on said common electrode; and

forming a pixel electrode formed of a transparent conductive film on said [reflection layer] dielectric multi-layer film to form an auxiliary capacitance comprised of said pixel electrode, said dielectric multi-layer film, and said common electrode.